

Amendments to the Specification

Please amend the original specification as follows.

Please amend the paragraph beginning at page 1, line 7, as follows:

The present invention relates to an optical disk, an apparatus for playing back and apparatus for copying the optical disk, and a method of preventing an illegal use of the optical disk, and in particular, relates to a circular optical disk (recording medium) in which record signals such as images or voices are ciphered and recorded in order to protect their copyrights against illegal ~~copies~~ copying thereof, and to an apparatus for playing back or copying the optical disk.

Please amend the paragraph beginning at page 2, line 15, as follows:

Fig. 11 is a block diagram showing a rough construction of the conventional DVD player. In Fig. 11, 101 denotes the DVD disk shown in Fig. 12 ~~also~~, which also records the data information such as images or voices to be played back. 104 denotes an optical pickup which reads record signals of the DVD disk 101 using a laser ray. 105 denotes a transfer controller which moves the optical pickup 104 in the radial direction of the DVD disk 101 in order to read the record signals at arbitrary positions on the DVD disk 101. 106 denotes a disk motor which rotates the DVD disk 101. 107 denotes a first control circuit control circuit 109 digitizes (makes binary) the input which controls the optical pickup 104, the transfer controller 105 and the disk motor 106. 108 denotes an amplifier which amplifies the signals which have been read by the optical pickup 104. 109 denotes a second control circuit into which the output signals of the amplifier 108 are inputted. Based on the signals, the second control circuit 109 generates servo signals, such as focus error signals or tracking error signals, which are required when ~~the~~ optical pickup 104 reads the DVD disk 101, and then outputs them to the first control circuit 107. Further, the second signals of analog type. 110 denotes a demodulation circuit which analyzes the signals which have been read from the DVD disk 101 and digitized, and reconstructs the data information such as the original images or music. 111 denotes a system control circuit which controls the whole DVD player.

Please amend the paragraph beginning at page 3, line 18, as follows:

Hereinafter, actions of the DVD player having the above-mentioned construction will be described. When the DVD disk on the market is played back, at first, the transfer controller 105 is driven by the first control circuit 107 in accordance with the instruction of the system control circuit 111 so as to move the optical pickup 104 to an inner periphery side in the DVD disk 101. The signals, which have been read by the optical pickup 104, are amplified by the amplifier 108, and further digitized by the second control circuit 109. Then, the contents of the signals are read by the demodulation circuit 110. The modulation circuit 110 sends the results to the system control circuit 111. Then, the system control circuit 111 outputs another instruction to the first control circuit 107 again, if the read contents do not include the key information of the key information recording region 103 (see Fig. 12). Thus, the transfer controller 105 is driven by the first control circuit 107 so as to move the optical pickup 104 to a more inner position ~~in~~ of the DVD disk 101, and then the key information is searched.

Please amend the paragraph beginning at page 4, line 13, as follows:

The key information recorded in the inner portion of the DVD disk 101 is found ~~out~~ by repeating the abovementioned actions so that the information is read by the demodulation circuit 110. If the system control circuit 111 detects that the modulation circuit 110 has read the key information of the DVD disk 101, the transfer controller 105 is driven by the first control circuit 107 in accordance with the instruction of the system control circuit 111 so as to move the optical pickup 104 to an outer periphery side. Then, the optical pickup 104 reads the record signals in the main information region 102 of the DVD disk 101 (see Fig. 12). Because the record signals are generally ciphered, normal image signals or voice signals cannot be obtained if the record signals are played back as they stand. However, the record signals can be deciphered if the key information, which is recorded in the key information recording region 103 and has been read, is used. Thus, the demodulation circuit 110 deciphers the record signals of the main information region 102 using the key information which has been read so as to reconstruct the original and normal image data or voice data.

Please amend the paragraph beginning at page 6, line 5, as follows:

45 denotes a writable DVD disk (DVD-R disk). In the main information region 32 of the disk, signals can be freely recorded. 46 denotes other key information (second key information) which has been previously formed by means of pre-pits instead of the normal key information. The other key information has been previously recorded in the key information recording region 33 of the writable DVD disk 45 in such a manner that it cannot be rewritten. The second key information 46 is a data which is not available for the use of deciphering the cipher. That is, the second key information cannot decipher the cipher of any of the main data 44. Meanwhile, the contents in the main data 44 recorded in the main information region 32 of the writable DVD disk 45 are quite as same as those in the main data 44 of the original DVD disk 1.

Please amend the paragraph beginning at page 6, line 20, as follows:

However, even if someone intends to play back the writable DVD disk 45 using the above-mentioned DVD player, the second key information 46 recorded in the key information recording region 33 disposed at a predetermined position in the inner periphery portion of the writable DVD disk is the unavailable data which is different from the original data for deciphering the cipher, as described above. Therefore, even if the unavailable key information is used, the ciphered data cannot be reconstructed to the original and normal image signals or voice signals. As a~~an~~ consequence, it is designed that the illegally copied writable DVD disk cannot be played back.

Please amend the paragraph beginning at page 7, line 21, as follows:

As shown in Fig. 10, both of the main data 44 and the first key information 43 of the original DVD disk 1 ~~is~~ are copied and recorded in the main information region 32 of the writable DVD disk 45. Although the second key information 46, which is the original key information, has been previously recorded in the key information recording region 33 of the writable DVD disk 45, the second key information 46 is the unavailable data for deciphering the data of the main information region 32, as described above. In this case, it is impossible to decipher the main data 44 using the second key information 46 located at the predetermined position. However, it is possible to decipher the cipher, if the first

key information. 43 recorded in the main information region 32, which is not located at the predetermined position, is used.

Please amend the paragraph beginning at page 8, line 11, as follows:

Hereinafter, there will be described such a case that a writable DVD disk is played back using a DVD player with reference to Fig. 3 for the later-mentioned Embodiment 3 or 4 of the present invention for ~~the convenience~~² convenience's sake. In Fig. 3, at first, ~~the~~ a transfer controller 4 is driven by ~~the~~ first control means 6 in accordance with ~~the~~ second control means 9 so as to move ~~the~~ an optical pickup 3 to the second subaltern information region located at the most inner periphery side of ~~the~~ a DVD disk 1. The optical pickup 3 reads disk information signals such as the disk type information and positional information of the first subaltern information region, which are stored in the second subaltern information region. The signals are amplified by ~~the~~ an amplifier 5. Further, the contents of the signals are detected by ~~the~~ demodulation means 7, and then judged by ~~the~~ disk judging means 14. In accordance with the read positional information of the first subaltern information region, the second control means and the first control means 6 drive the transfer controller 4 and make the transfer controller 4 move the optical pickup 3. Thus, the disk control information, which includes the key data of the first subaltern information region located at the normal position, is read.

Please amend the subheading at page 9, line 22, as follows:

~~Disclosure Of~~ Summary of the Invention

Please amend the paragraph beginning at page 10, line 13, as follows:

(1) Whether an optical disk is writable or not, is judged in accordance with ~~another~~ a disk signal other than disk control information.

Please amend the paragraph beginning at page 11, line 6, as follows:

More concretely, according to the present invention, (a) an apparatus for playing back an optical disk having a groove, which includes a main information region in which ciphered data information is recorded in the groove, and a subaltern information region

for recording disk control information including key information for deciphering the data information, is characterized in that it includes (b) a protective condition judging means for judging whether the data information is protected by a copyright or not on the basis of the disk control information when the data information is played back, (c) a disk judging means for judging whether the optical disk is writable or not on the basis of ~~other~~ information other than the disk control information when the data information is played back, and (d) a disk playback preventing means for preventing the optical disk from being played back if it is judged that the data information is protected by the copyright by the protective condition judging means and it is judged that the optical disk is writable by the disk judging means.

Please amend the paragraph beginning at page 14, line 12, as follows:

In the optical disk, it is preferable that the disk control information including the key information for deciphering the data information is recorded in the first subaltern information region, while at least positional information of the first subaltern information region is recorded in the second subaltern information region. Further, it is more preferable that the disk control information in the first subaltern information region and the disk control information in the second subaltern information region are formed by means of ~~different~~ recording methods to different from each other.

Please amend the paragraph beginning at page 14, line 23, as follows:

Meanwhile, in the optical disk, it is preferable that the disk control information in the first subaltern information region is formed by means of pre-pits. Further, it is more preferable that the disk control information in the second subaltern information region is formed by means of a laser trimming process. Because the laser trimming process can be performed after the disk has been completed, key information of the copyright holder and disk ID information, etc. can be also recorded.

Please amend the paragraph beginning at page 16, line 2, as follows:

According to the present invention, a method of preventing an illegal use of an optical disk having, a groove, (a) which includes a main information region in which

ciphered data information is recorded in the groove, and a subaltern information region for recording disk control information including key information for deciphering the data information, is characterized in that it includes the steps of (b) judging whether the data information is protected by a copyright or not on the basis of the disk control information when the data information is played back, (c) judging whether the optical disk is writable or not on the basis of ~~other~~ information other than the disk control information, and (d) preventing the optical disk from being played back if the data information is protected by the copyright and the optical disk is writable. As the optical disk used herein, for example, a write-once optical disk may be mentioned.

Please amend the paragraph beginning at page 16, line 23, as follows:

Meanwhile, in the method of preventing the illegal use of the optical disk, it is preferable that the ~~other~~ information other than the disk control information is at least one in such information set of (a) whether the groove is provided with a wobble or not, (b) whether the subaltern information region is provided with a sub-groove portion which connects a predetermined portion of the groove to an adjacent portion of the groove or not, and (c) whether another subaltern information region which is different from ~~said~~ the subaltern information region, is provided with a code indicating that the optical disk is writable, or not, while (d) it is judged that the optical disk is writable if at least one of the wobble, the sub-groove and the code is detected.

Please amend the paragraph beginning at page 19, line 1, as follows:

According to the present invention, a ~~much~~ further method of preventing an illegal use of an optical disk of writable type having (a) a main information region for recording ciphered data information which is recorded in a recording layer within a groove extending along a spiral track in such a manner that the data information can be read using light, a first subaltern information region located at an inner periphery side in comparison with the main information region, and a second subaltern information region located at an inner periphery side in comparison with the main information region, and a second subaltern information region located at an inner periphery side in comparison with the first subaltern information region, is characterized in that it includes the steps (b)

preventing disk control information recorded in a subaltern information region of a read only optical disk from being copied to the first subaltern information region of the optical disk of writable type, by previously forming the disk control information of the first subaltern information region by means of pre-pits or by providing a sub-groove, which connects a predetermined portion of the groove to an adjacent portion of the groove, in the first subaltern information region, (c) judging whether the data information recorded in the optical disk of writable type is protected by a copyright or not on the basis of the disk control information recorded in the first subaltern information region when the data information is played back, and (d) preventing the optical disk from being played back if the data information is protected by the copyright. As the optical disk used herein, for example, a write-once optical disk may be mentioned.

Please amend the paragraph beginning at page 20, line 9, as follows:

According to any one of the optical disk, the apparatus for playing back or copying the optical disk, and the method of preventing the illegal use of the optical disk, an illegal use of the optical disk such as a DVD disk, which may infringe the a copyright, can be physically or electrically prevented with a good efficiency.

Please amend the subheading at page 21, line 19, as follows:

~~Best Mode for Carrying Out~~ Detailed Description of the Invention

Please amend the paragraph beginning at page 22, line 4, as follows:

Fig. 1 is a block diagram showing the construction of the conventional DVD player according to the present invention. In Fig. 1, 1 denotes the DVD disk which records data information such as images or voices to be played back. In the DVD disk 1, the data information is ciphered and recorded in order to generally protect its copyright from an illegal ~~copy~~ copying, ~~in~~ and as a consequence, key information for deciphering the data information is also recorded in a predetermined region on the DVD disk 1.

Please amend the paragraph beginning at page 23, line 1, as follows:

10 denotes a wobble detecting means which generates and detects a wobble signal obtained from the focus error signal, the tracking error signal or the like. The concrete construction of the wobble will be described later (see Fig. 5). 9 denotes a second control means which includes a protective condition judging means 13 into which a signal is inputted from the ~~modulation~~ demodulation means 7, and a disk judging means 14 into which a signal is inputted from the wobble detecting means 10. The protective condition judging means 13 extracts and judges a code indicating existence of a copyright protection from disk control information in the detected signals which are demodulated. The disk judging means 14 judges whether the DVD disk 1 is a writable DVD disk or not, in accordance with the existence of the wobble signal.

Please amend the paragraph beginning at page 23, line 23, as follows:

Fig. 5 is a partially sectioned perspective view of a write-once DVD disk with a wobble. As shown in Fig. 5, in the DVD disk 1a, a groove 21 (groove portion) or its track (spiral), which is formed on a surface of a substrate 20, meanders. The meandering structure (state) of the groove 21 is referred to ~~the~~ as a wobble 23. Hereupon, a land portion 22 is formed between a portion of the groove 21 and an adjacent portion of the groove 21 in the radial direction of the disk.

Please amend the paragraph beginning at page 24, line 7, as follows:

As described above, in the DVD player according to Embodiment 1, it is judged whether the groove 21 is provided with the ~~groove~~ wobble 23 or not. Then, it is judged that the DVD disk 1 is a writable optical disk if the wobble 23 is detected. Thus, if the data information is protected by the copyright, the playback of the DVD disk is prevented. Therefore, an illegal use of the DVD disk, which infringes the copyright, may be effectively prevented in the physical or electrical manner.

Please amend the paragraph beginning at page 24, line 17, as follows:

Hereinafter, Embodiment 2 will be described while taking the case that a DVD disk is played back, fundamentally, with reference to Fig. 2 and Fig. 6. In Embodiment 2,

it is judged whether a DVD disk to be played back is a writable DVD disk or not, in accordance with existence of a sub-groove portion. Hereupon, fundamental portions in Fig. 2 and Fig. 6 are common with those in Fig. 1 and Fig. 5, respectively. Therefore, in order to avoid duplicated descriptions, the members or elements, which are common with the both figures, are given the same reference numbers, and then the description as to the members or elements are omitted.

Please amend the paragraph beginning at page 25, line 14, as follows:

Thus, in the DVD player according to Embodiment 2, the second control means 9 includes the protective condition judging means 13 into which a signal from the demodulation means 7 is inputted, and the disk judging means 14 into which a signal from the sub-groove portion detecting means 11 is inputted. Then, the protective condition judging means 13 extracts and judges a code indicating existence of the copyright protection from the disk control information in the detected signals which are demodulated, while the disk judging means 14 judges whether the DVD disk is a writable DVD disk or not, in accordance with existence of the signal from the sub-groove portion. The playback preventing means 15 receives the judgement results of the protective condition judging means 13 and the disk judging means 14, and then prevents the signal obtained by demodulating the data information from being outputted from the output means 8 if the data information is protected by the copyright and if the DVD disk is writable. Hereupon, if the incident rays arrive at the sub-groove portion, the optical pickup moves to an adjacent portion of the groove via the sub-groove portion, in accordance with the control signal from the tracking error signal. Therefore, it may be also possible to make the ~~read~~ reading of the disk control information such as the key information, etc. impossible, by providing the sub-groove portion.

Please amend the paragraph beginning at page 26, line 14, as follows:

Fig. 6 is a partially sectioned perspective view of a write-once DVD disk provided with a sub-groove portion. As shown in Fig. 6, in the DVD disk 1b, on a surface of the substrate 20 (subaltern information region), there is formed a sub-groove 24 which connects a predetermined position of the groove 21 to an inner side adjacent position of

the groove 21. Thus, in the DVD player, it is judged whether the DVD disk is writable or not, in accordance with existence of the sub-groove portion 24. At the occasion, in the recording apparatus or the copying apparatus, it may be possible to make the ~~read~~ reading of the key information impossible by providing the sub-groove portion before the control information region for preventing the copy of the key information or the like. Then, it may be possible to strengthen the copy preventing function by moving the pickup to the former position after having passed through a certain region. Hereupon, the pickup is moved by means of another sub-groove portion which leads the pickup to the former position, or by means of the track jump.

Please amend the paragraph beginning at page 27, line 8, as follows:

As described above, in the DVD player according to Embodiment-2, it is detected whether the sub-groove portion 24 exists or not. If the sub-groove portion 24 is detected, it is judged that the DVD disk 1 is a writable optical disk. Then, if the data information is protected by the copyright, the playback of the DVD disk is prevented. Therefore, an illegal use of the DVD disk, which ~~infringe~~ infringes the copyright, may be effectively prevented in the physical or electrical manner.

Please amend the paragraph beginning at page 27, line 18, as follows:

Hereinafter, Embodiment 3 will be described while taking the case that a DVD disk is played back, fundamentally, with reference to Fig. 3 and Fig. 7. In Embodiment 3, it is judged whether a DVD disk to be played back is a writable DVD disk or not, in accordance with whether a second subaltern information region (inner periphery side in comparison with a first subaltern information region), which is different from a first subaltern information region (ordinary subaltern information region), is provided with a code (hereinafter, referred to “disk judging code”) indicating that the DVD disk is writable, or not. Hereupon, fundamental portions in Fig. 3 are common with those in Fig. 1. Therefore, in order to avoid duplicated descriptions, the members or elements, which are common with the both figures, are given the same reference numbers, and then the description as to the member or elements are omitted.

Please amend the paragraph beginning at page 30, line 6, as follows:

As described above, in the DVD player according to Embodiment 3, it is detected whether the disk judging code exists or not in the second subaltern information region 28. If the disk judging code is detected, it is judged that the DVD disk 1 is a writable optical disk. Then, if the data information is protected by the copyright, the playback of the DVD disk is prevented. Therefore, an illegal use of the DVD disk, which ~~infringe~~ infringes the copyright, may be effectively prevented in the physical or electrical manner. It is probable that if an illegal first subaltern information region is recorded in the main information region, the disk control information such as the key information or the like may be illegally copied so that the ciphered data may be demodulated. However, if the second subaltern information region, which is located at the most inner position, is formerly read, the normal position of the first subaltern information region can be identified in the present invention so that the illegal ~~copy~~ copying may be prevented. Hereupon, the key information may be recorded in the second subaltern information region.

Please amend the paragraph beginning at page 32, line 13, as follows:

As described above, in the DVD player according to Embodiment 4, it is detected whether the pre-pits 29 exist or not in the subaltern information region. If the pre-pits 29 are detected, it is judged that the DVD disk 1 is a writable optical disk. Then, if the data information is protected by the copyright, the playback of the DVD disk is prevented. Therefore, an illegal use of the DVD disk, which ~~infringe~~ infringes the copyright, may be effectively prevented in the physical or electrical manner.

Please amend the paragraph beginning at page 32, line 23, as follows:

Hereinafter, Embodiment 5 will be described while taking the case that a DVD disk is played back, fundamentally, with reference to Fig. 4. In Embodiment 5, it is judged whether a DVD disk to be played back is a writable DVD disk or not, on the basis of a plurality of elements in the group of a wobble, a sub-groove portion, a disk judging code and pre-pits. Hereupon, fundamental portions in Fig. 4 are common with those in Fig. 1. Therefore, in order to avoid duplicated descriptions, the members or elements;

which are common with the both figures, are given the same reference numbers, and then the description as to the members or elements are omitted.

Please amend the paragraph beginning at page 33, line 10, as follows:

As shown in Fig. 4, in Embodiment 5, the wobble detecting means 10 is provided as the same as in the case of Embodiment 1, and further the sub-groove portion detecting means 11 is provided-as the same as in the case of Embodiment 2. Moreover, the disk judging means 14 composing the second control means 9 can judge existence of each of the disk judging code and the pre-pits-as the same as in the case of Embodiments 3,4. The other construction is as same as that of the DVD player according to Embodiment 1 (Fig. 1).

Please amend the paragraph beginning at page 33, line 19, as follows:

Thus, in the DVD player according to Embodiment 5, it is judged whether the DVD disk 1 is a writable DVD disk or not, on the basis of a plurality of elements in the group of existence of the wobble, existence of the sub-groove portion, existence of the disk judging code and existence of the pre-pits. Therefore, the accuracy of the judgement of the disk type may be improved in comparison with the cases of not, with Embodiments 1 to 4 so that an illegal use of the DVD disk, which infringes the ~~copy right~~ copyright, may be prevented more effectively.

Please amend the paragraph beginning at page 34, line 23, as follows:

As described above, the optical disk, the apparatus for playing back and apparatus for copying the optical disk, and the method of preventing the illegal use of the optical disk, according to the present invention, are useful as an optical apparatus which can effectively prevent the illegal use of the DVD disk or other optical disks in physical or electrical manner, and particularly are suitable for ~~using~~ use as a means to propagate intellectual works such as images, voices or the like while protecting the copyrights thereof.